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NORTHEASTERN RESEARCH NOTES

NORTHEASTERN FOREST EXPERIMENT STATION
UPPER DARBY PA R. W. MARQUIS DIRECTOR

Budworm Damage In Canada:
Some Observations On Mortality

Information about spruce budworm damage in Canadian forests may be useful in reducing losses in Maine if the infestation becomes epidemic there. For this reason the Northeastern Forest Experiment Station has been studying the budworm epidemic in southwestern Quebec since 1945. Since trees are still dying, results of these studies must be considered indicative rather than conclusive.

So far, only balsam fir trees have been killed on the Quebec area under study. Although the first severe defoliation due to budworm took place in 1944, no mortality was observed until 1949. Once trees started to die, however, the mortality rate went up fast: from zero in 1948 to 25% in 1949, then to 48% in 1950.

Losses have been somewhat greater among trees 1 to 3 inches d.b.h. (53%) than among trees 4 inches and larger (38%). Stands on poorly drained sites were hit harder than those on drier sites. Scattered trees left after heavy cuttings were nearly all killed.

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Other observations were based on selected sample trees. The proportion of dominant and intermediate trees killed is twice that of over topped (but not necessarily suppressed) trees--regardless of size. This reflects the tendency for large budworm populations to develop in the upper crowns of dominant and intermediate trees, where they can get sunlight. It explains, in part at least, the forest canopy's so-called "protective" effect on overtopped trees.

Of the trees with small crowns (crown ratio 0.3 or less), 75% have already died, as compared with 43% of the trees with larger crowns. Vigor, as judged by eye, is also associated with mortality; 62% of the slow-growing vigor III trees have died; 42% of the vigor I trees. Of the trees described in 1948 as "heavily defoliated", 72% have died. Only 23% of those classed as having "light" or "medium" damage have died.

Conclusions from these preliminary observations can be summarized as follows:

There may be a 6-year salvage period between attack and mortality.

Stands on wet sites and having a large proportion of big, old, dominant fir trees should be cut first.

Vigorous, fast-growing trees with large crowns are relatively good risks.

Young fir stands that are growing under a protective hardwood canopy are less subject to damage.

--THOMAS F. McLINTOCK

Stump Diameter Related To D.b.h.
For Spruce-Fir Region

Stump diameter has long been used in the spruce-fir region as a guide in setting up cutting limits. However, it has usually been applied with only a vague idea of what d.b.h. (diameter breast high) classes were involved.

Since there is a trend toward higher diameter limits--and tighter control over cutting--it is becoming more important that foresters know what a given stump-diameter limit means with respect to the d.b.h. of trees to be cut or left standing. Or, to put it another way, once the forester has set up d.b.h. classes as cutting limits, he may need to translate them into stump diameters for the benefit of cutters, scalers, and inspectors who are accustomed to thinking in terms of stump rather than d.b.h.

The following table is offered as a guide for converting d.b.h. to stump diameter, or vice versa. These relationships were developed from

Table 1.--Relationship of stump diameter to d.b.h. for spruce-fir region, in inches

D.b.h.	Stump	D.b.h.	Stump	Stump	D.b.h.	Stump	D.b.h.
5	6.4	13	15.9	7	5.6	15	12.3
6	7.5	14	17.1	8	6.5	16	13.1
7	8.7	15	18.3	9	7.3	17	14.0
8	9.9	16	19.5	10	8.2	18	14.8
9	11.1	17	20.7	11	9.0	19	15.6
10	12.3	18	22.0	12	9.8	20	16.5
11	13.5	19	23.1	13	10.7	21	17.2
12	14.7	20	24.2	14	11.5	22	18.0

curves based on measurement of 268 spruce and 804 fir trees, taken throughout Maine on pulpwood operations. Separate curves were made for each species but the differences were negligible; so the two were combined.

--THOMAS F. McLINTOCK

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